Blood and Urine Collection

Venipuncture

Public Health Objectives:

Venipuncture is performed to obtain laboratory results that provide prevalence estimates of disease, risk factors for exam components, and baseline information on health and nutritional status of the population.

Staff:

Certified Phlebotomist

Protocol:

Methods:

Blood is drawn from the examinee's arm. In the laboratory the blood is processed, stored and shipped to various laboratories for analysis. The complete blood count (CBC) results are reported in the MEC and all other results are reported from NCHS to the participant.

The volume of blood drawn by age follows.

- 1-2 years, 9 ml (0.3 ounces), 0.6 tablespoons
- 3-5 years, 20 ml (0.7 ounces), 1.3 tablespoons
- 6-11 years, 34 ml (1.1 ounces), 2.3 tablespoons
- 12+ 104 ml (3.4 ounces), 6.9 tablespoons

Time Allotment:

Depending on age of participant. Range 5-10 minutes.

Health Measures:

Laboratory test results.

Eligibility:

Sample persons aged 1 year and older who do not meet any of the exclusion criteria.

Exclusion Criteria:

- Hemophiliacs
- Participants who received chemotherapy within last 4 weeks
- The presence of the following on both arms: rashes, gauze dressings, casts, edema, paralysis, tubes, open sores or wounds, withered arms or limbs missing, damaged, sclerosed or occluded veins, allergies to cleansing reagents, burned or scarred tissue, shunt or IV.

Justification for using vulnerable populations:

- Minors are included in this component because they are an important target population group. Laboratory data are linked to other household interview and health component data and are used to track changes that occur in health over time.
- There is no reason to exclude mentally impaired or handicapped individuals because there is no contraindication.

Risks:

The following are known risks associated with venipuncture:

- Hematoma
- Swelling, tenderness and inflammation at the site
- Persistent bleeding
- Vasovagal response - dizziness, sweating, coldness of skin, numbness and tingling of hands and feet, nausea, vomiting, possible visual disturbance, syncope and injury fall from fainting.

Rare adverse effects:

- Thrombosis of the vein due to trauma.
- Infection which results in thrombophlebitis.

Special precautions:

- Sterile equipment issued with all sample persons.
- Physician on call in case an adverse affect occurs.

Report of Findings:

Reported in the MEC:

Complete Blood Count (CBC)

Reported from NCHS:

Other laboratory results

Urine Collection

Public Health Objectives:

Urine is collected to obtain laboratory results that provide prevalence estimates of disease, risk factors for exam components, and baseline information on health and nutritional status of the population.

Staff:

MEC Coordinator

Protocol:

Methods:

Urine is collected from individuals aged 6 years and above.

Time Allotment:

2 minutes

Health Measures:

Laboratory test results.

Eligibility:

Sample persons aged 6 years and above.

Exclusion Criteria:

None

Justification for using vulnerable populations:

- Minors are included in this component because they are an important target population group. Laboratory data are linked to other household interview and health component data and are used to track changes that occur in health over time.
- There is no reason to exclude mentally impaired or handicapped individuals because there is no contraindication.

Risks:

None

Special precautions:

None

Report of Findings:

Reported in the MEC: Pregnancy Test
Reported from NCHS: Other laboratory results

Bone Mineral Status Markers

Laboratory Measures:

Bone alkaline phosphatase, vitamin D and serum parathyroid hormone

Public Health Objectives:

Evaluation of bone mineral status will utilize an evaluation of vitamin D status based on two analytes: serum 25-hydroxyvitamin D and parathyroid hormone. Vitamin D is essential for active intestinal calcium absorption and plays a central role in maintaining calcium homeostasis and skeletal integrity. In addition, vitamin D has recently been linked to other non-skeletal conditions of public health significance, such as hypertension, and cancer. Vitamin D is derived mainly from cutaneous synthesis in the presence of ultraviolet sunlight while dietary intake constitutes a minor fraction. Serum 25(OH) D is the best indicator of vitamin D status. It is converted in the kidney, stimulated by parathyroid hormone (PTH), to the hormonally active metabolite 1,25-dihydroxyvitamin D (1,25 $(OH)_2D$). Serum parathyroid hormone concentration is a very sensitive indicator of calcium homeostasis and vitamin D deficiency. The inclusion of this measure to the NHANES laboratory protocol will increase the usefulness of the vitamins D measurement in evaluating vitamin D status particularly as it relates to skeletal status. The inclusion of both these markers in the NHANES survey will provide a more complete picture of vitamin D status.

Inclusion of serum 25(OH)D in NHANES will allow us to continue to assess vitamin D status in the population, while inclusion of PTH will help us better interpret the meaning of low 25(OH)D values in various groups. Interest in vitamin D status in the US has increased significantly in recent year. For example, questions have been raised recently about the extent of vitamin D deficiency and insufficiency in the U.S. population. Furthermore, the adequacy of the 1997 Dietary Reference Intake recommendations for vitamin D in the U.S. are now being questioned, especially since new data suggests that optimal serum 25(OH)D levels may be noticeably higher than previously thought. Finally, recent studies have clarified that rickets still occurs in the U.S. Thus, it is important to include these two measures of vitamin D status in the NHANES survey. In addition, these measures can be linked with other measures included in the survey, such as blood pressure and bone mineral density, in order to evaluate its role in both skeletal and nonskeletal conditions.

It has been estimated that the annual cost of osteoporosis is about $10 billion. The magnitude of this problem is likely to increase dramatically over the next few decades as the population ages. The risk of hip fractures (the most costly fractures in terms of morbidity, mortality and health care costs) begins to increase exponentially after age 65.

Important pieces of data are not currently available about the changes in bone mass in the population, especially in minority populations. There are no data on total body bone measures from a nationally representative sample. Measures of total body bone mineral content or density will allow researchers to gain insights

into age, sex, and racial/ethnic differences in the skeleton relative to other measures of body composition such as total muscle and fat mass, as well as behavioral factors such as diet and activity.

Childhood and adolescence are the periods to target for intervention strategies in osteoporosis. Measurement in younger individuals will provide insight into early racial/ethnic differences in the rate of bone accretion. Furthermore, correlation of DXA measures with bone markers over age can provide information about the utility of these markers as surrogates for bone density or content when seeking age of peak bone mass or indicators of high or low bone turnover. This information is crucial to understanding when the best and most effective dietary intervention can be implemented to maximize peak bone mass.

NHANES is the only nationally representative survey that can shed light on when peak bone mass is attained and the degree of total body bone loss with age. This information is vital to all aspects of treatment and prevention of this disease and is particularly critical to government funding of related research, medical screening, treatment, and reimbursement programs.

Data on bone status and its relationship to age among racial ethnic groups can be used to target osteoporosis prevention programs to the most important age groups. The data from the DXA scans and the bone marker studies will also provide important reference distributions and allow studies of the association between bone status, diet, activity, and other body composition measures.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Bone alkaline phosphatase	8 to 49 years	500 uL			
Vitamin D	1 and older	300-500 uL			
Parathyroid hormone	6 and older	1 mL		✓	✓

Vitamin D deficiency leads to a decrease in calcium absorption in the gastrointestinal tract and overproduction of parathyroid hormone. Increased PTH may also be found with other conditions such as hyperthyroidism, malabsorption and some cancers. PTH levels outside the normal range will be reported to NHANES participants.

Normal ranges: age <45 years: 10-45 pg/ml [intact immunoradiometric assay (IRMA)]

Age 45+: 10-65 pg/ml references ranges.

Diabetes Profile

Laboratory Measures:

Fasting Glucose, C-peptide, Insulin, and Glycohemoglobin

Public Health Objectives:

Diabetes mellitus will be assessed by fasting measures of plasma glucose, insulin, c-peptide and glycohemoglobin in 12 years and over.

Diabetes is a large, growing, and costly public health problem in the United States and disproportionately affects racial and ethnic minorities. About 17 million Americans have diabetes and over 1 million new cases of diabetes are diagnosed each year. Diabetes is the leading cause of kidney failure, non-traumatic lower extremity amputation, and blindness in working-age adults, and an estimated $135 billion were spent on direct and indirect medical costs for diabetes in 2002. Alarmingly, type 2 diabetes (formerly considered an adult disease) is now being diagnosed in children and adolescents and there has been a large increase in diagnosed diabetes among adults <40 years of age.

Information on the prevalence of diabetes disease, especially in its early stages, and associated risk factors will be used to help develop early intervention and prevention programs for the disabling consequences of this condition.

Specifically, the diabetes disease examination will provide population data to:

1. determine a national estimate of diabetes disease prevalence (diagnosed and undiagnosed), including those at high risk for the late complications of the disease;
2. identify the risk factors of diabetes disease;
3. permit a national cohort to be established for follow-up studies of this condition; and
4. provide critical information to clinicians and public health officials for the development of preventive care and community-based interventions.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Glucose	**12 and older**	**500uL**		✓	✓
Insulin/C peptide	**12 and older**	**1 mL**			
Glycohemoglobin	**12 and older**	**400 uL**		✓	✓

Infectious Disease Profile

Laboratory Measures:

Hepatitis viruses, Methicillin-resistant *Staphylococcus aureus*, and *Toxoplasma*

Public Health Objectives:

Hepatitis viruses

Viruses that primarily infect the liver constitute a major public health problem because of the morbidity and mortality associated with the acute and chronic consequences of these infections. New immunization strategies have been developed to eliminate transmission of hepatitis B and hepatitis A viruses in the United States. Because of the high rate of asymptomatic infection with both viruses, NHANES will provide the best means for determining the age-specific effectiveness of immunization strategies to prevent these infections. In addition, NHANES provides the means to better define the epidemiology of hepatitis viruses that were recently characterized, such as hepatitis C and G virus along with D and possibly F. In NHANES testing for markers of infection with the hepatitis viruses will be used to determine secular trends in infection rates across most age and racial/ethnic groups, and will provide a national picture of the epidemiologic determinants of these infections.

Among children age 2-5 years anti-HBs (a maker of immunity) testing will be performed to assist in the evaluation of the hepatitis B immunization program. If sufficient sera are available, other hepatitis markers will be measured.

Staphylococcus aureus

Staphylococcus aureus is one of the most common causes of skin and soft tissue infection in both the health care and community settings. Antimicrobial resistance in *S. aureus* has increased dramatically, particularly in the hospital, where the rapid emergence of methicillin-resistant *S. aureus* (MRSA) has left only one intravenous antimicrobial, vancomycin, as a treatment option; the appearance of *S. aureus* isolates with resistance to vancomycin (VISA) has led to concern that this organism may become untreatable with currently available antimicrobials. Previously limited to hospitals, MRSA infections have been increasingly reported in the community, and it is unclear whether resistance in spreading from hospitals or another unidentified source. Risk factors for MRSA infection include hospitalization, antimicrobial use, underlying medical illness, and proximity to individuals with MRSA infection or colonization, including health care workers. Since the carrier state is asymptomatic, and transmission of MRSA can occur from any individual colonized with MRSA, in order to estimate the potential for spread of MRSA in the community, it is important to measure the MRSA carriage rate through a population-based study. However, no prospective, population-based prevalence study has been done to measure the prevalence of MRSA in the community, and no national surveillance exists to provide a reliable national population estimate. Therefore NHANES participants who consent will be cultured for MRSA.

Toxoplasma gondii

According to a 1999 CDC report, toxoplasmosis is the third leading cause of death due to food-borne infections and leads to an estimated 400 to 6,000 cases of congenital infection in the United States. The accuracy of these estimates, however, is unknown. Evidence from Europe suggests that the incidence of toxoplasmosis has dropped substantially in the last decade; data from the U.S. is less clear cut but also suggests a decline. Serologic tests are available to determine who has become infected with toxoplasmosis. *Toxoplasma*-specific IgG antibodies are detectable 1–3 weeks after infection and remain detectable for the life of the individual. Serum tests for will obtain the most accurate information available about the prevalence of toxoplasmosis in the U.S. and determine if the rates are changing over time. *Toxoplasma* IgG antibody was measured in NHANES III with an overall prevalence of 22.5%.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Hepatitis viruses	2-5 (anti-HBs), 6+	0.2 ml, 1.5 ml		✓	
MRSA	1 +	Nasal Swab – No blood			
HPV	6-59	500 µL			
Toxoplasma gondii	1+			✓	

Markers of Immunization Status

Laboratory Measures:

Measles, rubella, and varicella.

Public Health Objectives:

Measles

Measles is a highly infectious disease which was targeted for elimination in the United States by the year 1996. The elimination strategy called for vaccination of all susceptible persons at age 12-15 months and at 4-11 years. NHANES will assess age-specific population immunity, taking into account vaccinees who never develop antibodies, persons who may lose immunity over time, and persons who are immune from natural disease. The U.S. measles elimination goal for 1996 came at a time when measles elimination was being considered as an achievable goal world-wide by the World Health Organization. If success can be demonstrated in the U.S. as well as other countries in the hemisphere, world-wide efforts to eliminate measles will be encouraged. The benefit from a study of measles seroprevalence will be to document age-specific immunity that is found following measles elimination efforts and to help judge the levels of immunity that are needed to eliminate measles.

Rubella

Congenital rubella syndrome (CRS) is the term used to describe the serious birth defects that occur among infants born to women infected with rubella while pregnant. A single rubella vaccination, usually given as measles- mumps-rubella (MMR) vaccine, is thought to confer lifelong immunity. Widespread use of the vaccine has resulted in near elimination of CRS in the United States. In recent years, an increasing proportion of rubella cases have been reported among adults, and outbreaks have occurred among persons of Hispanic ethnicity. Population-based rubella seroprevalence studies would provide valuable information about specific groups that lack rubella immunity and therefore could be targeted for immunization. Therefore serologic testing of NHANES participants will be conducted to document the level of immunity to rubella by race and ethnicity and allow comparison data from NHANES III.

Varicella

In March 1995, a vaccine for prevention of varicella (chicken pox) was licensed for use in persons 1 year of age and older. Wide use of the vaccine may change the epidemiology of the disease with a shift in incidence to older persons who are at higher risk than are younger persons for more severe disease and complications. Older persons may have severe complications such as encephalitis and/or death if they develop varicella. Additionally, pregnant women can pass on varicella if they develop it in the last weeks of gestation with severe life-threatening consequences to the newborn. NHANES provides a unique opportunity to assess changes in the seroprevalence of immunity to varicella after introduction of the vaccine. Demographic data on immune and susceptible persons will help target vaccination programs toward groups at risk for disease.

Health Measures, Eligibility, Report of Findings: Miscellaneous Laboratory Assays

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Measles	6-49	100 uL			
Rubella	6-49	200 uL			
Varicella	6-49	100 uL			

Miscellaneous Laboratory Assays

Laboratory Measures:

C-reactive protein, Standard Biochemical Profile includes Alanine Aminotransferase (ALT), Albumin, Alkaline Phosphatase (ALP), Aspartate Aminotransferase (AST), Bicarbonate (HCO_3), Blood Urea Nitrogen (BUN), Calcium, Cholesterol, Creatinine, Gamma Glutamyltransaminase (γ-GT), Glucose, Iron, Lactate Dehydrogenase (LDH), Phosphorus, Sodium, Potassium, and Chloride, Total Bilirubin, Total Protein, Triglycerides, and Uric Acid.

Public Health Objectives:

C-reactive protein

C-reactive protein is considered to be one of the best measures of the acute phase response to an infectious disease or other cause of tissue damage and inflammation. It is used to correct the iron status measures which are affected by inflammation. It can also be used to measure the body=s response to inflammation from chronic conditions, such as arthritis, and environmental exposures to agents such as tobacco smoke.

Standard biochemical profile

This battery of measurements are used in the diagnosis and treatment of certain liver, heart, and kidney diseases, acid-base imbalance in the respiratory and metabolic systems, other diseases involving lipid metabolism and various endocrine disorders as well as other metabolic or nutritional disorders.

A. Alanine Aminotransferase (ALT)
   Alanine aminotransferase measurements are used in the diagnosis and treatment of certain liver diseases (e.g., viral hepatitis and cirrhosis) and heart diseases. Elevated levels of the transaminases can indicate myocardial infarction, hepatic disease, muscular dystrophy, or organ damage. Serum elevations of ALT activity are rarely observed except in parenchymal liver disease, since ALT is a more liver-specific enzyme than aspartate aminotransferase (AST).

B. Albumin
   Albumin measurements are used in the diagnosis and treatment of numerous diseases primarily involving the liver or kidneys.

C. Alkaline Phosphatase (ALP)
   Increased ALP activity is associated with two groups of diseases: those affecting liver function and those involving osteoblastic activity in the bones. In hepatic disease, an increase in ALP activity is generally accepted as an indication of biliary obstruction. An increase in serum phosphatase activity is associated with primary hyperparathyroidism, secondary hyperparathyroidism owing to chronic renal disease, rickets, and osteitis deformans juvenilia due to vitamin D deficiency and malabsorption or renal tubular dystrophies. Increased levels of ALP are also associated with Von Recklinghausen's disease with

bone involvement and malignant infiltrations of bone. Low levels are associated with hyperthyroidism, and with the rare condition of idiopathic hypophosphatasia associated with rickets and the excretion of excess phosphatidyl ethanolamine in the urine.

D. Aspartate Aminotransferase (AST)
AST measurements are used in the diagnosis and treatment of certain types of liver and heart disease. Elevated levels of the transaminases can signal myocardial infarction, hepatic disease, muscular dystrophy, or organ damage.

E. Bicarbonate (HCO3)
Together with pH determination, bicarbonate measurements are used in the diagnosis and treatment of numerous potentially serious disorders associated with acid-base imbalance in the respiratory and metabolic systems.

F. Blood Urea Nitrogen (BUN)
BUN measurements are used in the diagnosis of certain renal and metabolic diseases. The determination of serum urea nitrogen is the most widely used test for the evaluation of kidney function. The test is frequently requested in conjunction with the serum creatinine test for the differential diagnosis of prerenal, renal, and postrenal uremia. High BUN levels are associated with impaired renal function, increased protein catabolism, nephritis, intestinal obstruction, urinary obstruction, metallic poisoning, cardiac failure, peritonitis, dehydration, malignancy, pneumonia, surgical shock, Addison's disease, and uremia. Low BUN levels are associated with amyloidosis, acute liver disease, pregnancy, and nephrosis. Normal variations are observed according to a person's age and sex, the time of day, and diet, particularly protein intake .

G. Calcium
Elevated total serum calcium levels are associated with idiopathic hypercalcemia, vitamin D intoxication, hyperparathyroidism, sarcoidosis, pneumocystic carinii pneumonia and blue diaper syndrome. Low calcium levels are associated with hypoparathyroidism, pseudohypoparathyroidism, chronic renal failure, rickets, infantile tetany, and steroid therapy.

H. Cholesterol
An elevated cholesterol level is associated with diabetes, nephrosis, hypothyroidism, biliary obstruction, and those rare cases of idiopathic hypercholesterolemia and hyperlipidemia; low levels are associated with hyperthyroidism, hepatitis, and sometimes severe anemia or infection.

I. Creatinine
Creatinine measurement serves as a test for normal glomerular filtration. Elevated levels are associated with acute and chronic renal insufficiency and urinary tract obstruction. Levels below 0.6 mg/dL are of no significance.

J. Gamma Glutamyltransaminase (γ-GT)
γ-GT measurement is principally used to diagnose and monitor hepatobiliary disease. It is currently the most sensitive enzymatic indicator of liver disease, with normal values rarely found in the presence of hepatic disease. It is also used as a sensitive screening test for occult alcoholism. Elevated levels are found in patients who chronically take drugs such as phenobarbital and phenytoin.

K. Glucose
Glucose measurements are used in the diagnosis and treatment of pancreatic islet cell carcinoma and of carbohydrate metabolism disorders, including diabetes mellitus, neonatal hypoglycemia, and idiopathic hypoglycemia.

L. Iron
Iron (non-heme) measurements are used in the diagnosis and treatment of diseases such as iron deficiency anemia, chronic renal disease, and hemochromatosis (a disease associated with widespread deposit in the tissues of two iron-containing pigments, hemosiderin and hemofuscin, and characterized by pigmentation of the skin) .

M. Lactate Dehydrogenase (LDH)
LDH measurements are used in the diagnosis and treatment of liver diseases such as acute viral hepatitis, cirrhosis, and metastatic carcinoma of the liver; cardiac diseases such as myocardial infarction; and tumors of the lungs or kidneys.

N. Phosphorus
There is a reciprocal relationship between serum calcium and inorganic phosphorus. Any increase in the level of inorganic phosphorus causes a decrease in the calcium level by a mechanism not clearly understood. Hyperphosphatemia is associated with vitamin D hypervitaminosis, hypoparathyroidism, and renal failure. Hypophosphatemia is associated with rickets, hyperparathyroidism, and Fanconi syndrome. Measurements of inorganic phosphorus are used in the diagnosis and treatment of various disorders, including parathyroid gland and kidney diseases and vitamin D imbalance.

O. Sodium, Potassium, and Chloride
Hyponatremia (low serum sodium level) is associated with a variety of conditions, including severe polyuria, metabolic acidosis, Addison's disease, diarrhea, and renal tubular disease. Hypernatremia

(increased serum sodium level) is associated with Cushing's syndrome, severe dehydration due to primary water loss, certain types of brain injury, diabetic coma after therapy with insulin, and excess treatment with sodium salts.
Hypokalemia (low serum potassium level) is associated with body potassium deficiency, excessive potassium loss caused by prolonged diarrhea or prolonged periods of vomiting and increased secretion of mineralocorticosteroids. Hyperkalemia (increased serum potassium level) is associated with oliguria, anuria, and urinary obstruction.

Low serum chloride values are associated with salt-losing nephritis, Addisonian crisis, prolonged vomiting, and metabolic acidosis caused by excessive production or diminished excretion of acids. High serum chloride values are associated with dehydration and conditions causing decreased renal blood flow, such as congestive heart failure.

P. Total Bilirubin
Elevated levels are associated with hemolytic jaundice, paroxysmal hemoglobinuria, pernicious anemia, polycythemia, icterus neonatorum, internal hemorrhage, acute hemolytic anemia, malaria, and septicemia. Low bilirubin levels are associated with aplastic anemia, and certain types of secondary anemia resulting from toxic therapy for carcinoma and chronic nephritis .

Q. Total Protein
Total protein measurements are used in the diagnosis and treatment of a variety of diseases involving the liver, kidney, or bone marrow, as well as other metabolic or nutritional disorders .

R. Triglycerides
Triglyceride measurements are used in the diagnosis of diabetes mellitus, nephrosis, liver obstruction, and other diseases involving lipid metabolism and various endocrine disorders and in the treatment of patients with these diseases.

S. Uric Acid
Uric acid measurements are used in the diagnosis and treatment of numerous renal and metabolic disorders, including renal failure, gout, leukemia, psoriasis, starvation or other wasting conditions and in the treatment of patients receiving cytotoxic drugs.

Health Measures, Eligibility, Report of Findings:

Health Measure		Eligibility	Volume Required	Report of Findings Level		
				1	2	3
C-reactive protein		1 and older	300 uL			
Biochemistry Profile		12+	800 uL			
	ALT				✓	✓
	AST				✓	✓
	Albumin				✓	✓
	Alkaline Phosphatase					✓
	Bicarbonate (HCO_3)				✓	✓
	BUN				✓	✓
	Calcium				✓	✓
	Cholesterol				*	*
	Creatinine				✓	✓
	GGT					✓
	Glucose				*	*
	Iron					*
	LDH					✓
	Phosphorus				✓	✓
	Sodium				✓	✓
	Potassium				✓	✓
	Chloride				✓	✓
	Total Bilirubin				✓	✓
	Total Protein				✓	✓
	Triglycerides				*	*
	Uric Acid				✓	✓

* Value may be reported from different assay

Kidney Disease Profile

Laboratory Measures:

Serum creatinine, blood urea nitrogen, urinary albumin and creatinine

Public Health Objectives:

The purpose of the kidney and urologic diseases portion of the NHANES is to determine prevalence of specific nephrologic and urologic conditions in the population; to determine the association between health conditions such as diabetes and hypertension and the development of kidney and urologic diseases; to monitor trends in the prevalence of these diseases and their risk factors over time. These data will be used to assist in planning for initiatives and other programs for the prevention and treatment of nephrologic and urologic diseases.

Blood specimens will be used to obtain measures of serum creatinine, blood urea nitrogen, urinary albumin and creatinine will be measured. Self-reported information on chronic analgesic use and incontinence will be collected.

The incidence of end stage kidney failure is increasing rapidly in the U.S. in adults of all age groups which implies that the prevalence of progressive renal impairment is also increasing. However, little information is known about the prevalence of chronic renal impairment on a national level. Urologic disease, including urinary incontinence affects a large proportion of the population. Little nationally representative data on the prevalence and risk factors associated with these conditions are available.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Serum Creatinine/blood urea nitrogen	12 and older	1 mL		✓	✓
Urinary albumin and creatinine	6 and older	3 mL			

Pregnancy Test and Prostate Specific Antigen (PSA)

Laboratory Measures:

Pregnancy test., PSA

Public Health Objectives:

Pregnancy test

Information on current pregnancy status will be used to exclude participants from the DXA examination and the OGTT test and for interpretation of current nutritional status and body measures.

PSA test

Prostate cancer is the most common non-skin malignancy among men with approximately 180,000 new cases diagnosed and 37,000 deaths in 1999. The total and free PSA tests have been recognized as tumor markers for the screening, diagnosis and management of prostate cancer. The total PSA is not specific for prostate cancer. Mildly elevated total PSA (above the cutoff of 4 ng/mL) can be seen in benign prostatic hypertrophy and prostatitis. Falsely low PSA may be seen in men treated with finasteride or taking herbals such as Saw Palmetto. The more recent free PSA assay is recommended to increase the specificity when the total PSA is between 4-10 ng/mL. A percent free PSA (free/total PSA X 100%) of less than 25% suggests prostate cancer

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Urine: Pregnancy Test	8 -59 females	1 mL			✓
PSA test	Males 40 +	1 ml		✓	✓

Report of Findings:

PSA:

Male survey participants tested for PSA will receive test results in their Final Report of Findings. If the result is greater than 4 ng/mL, an early reporting letter will be sent.

Nutritional Biochemistries and Hematologies

Laboratory Measures:

- Complete blood count
- Erythrocyte protoporphyrin
- Serum folate
- RBC folate
- Serum iron & UIBC
- Serum ferritin
- Transferrin receptor (TfR)
- Transferrin saturation (TS) (calculated from iron and TIBC)
- Serum vitamin C
- Serum vitamin A/E/carotenoides
- Plasma homocysteine
- Serum vitamin B_{12}
- Serum vitamin B_6
- Methylmalonic acid (MMA)
- Selenium

Public Health Objectives:

The objectives of this component are to:

1) Provide data for monitoring secular trends in measures of nutritional status in the U.S. population;
2) Evaluate the effect of people's habits and behaviors such as physical activity and the use of alcohol, tobacco, and dietary supplements on people's nutritional status; and
3) Evaluate the effect of changes in nutrition and public health policies including welfare reform legislation, food fortification policy, and child nutrition programs on the nutritional status of the U.S. population.

These data will be used to estimate deficiencies and toxicities of specific nutrients in the population and subgroups, to provide population reference data, and to estimate the contribution of diet, supplements, and other factors to serum levels of nutrients. Data will be used for research to further define nutrient requirements as well as optimal levels for disease prevention and health promotion.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Complete blood count	1 and older	1.5mL		✓	✓
Erythrocyte protoporphyrin	3-5 yrs, 12-49F	400 uL			✓
Serum iron & UIBC, saturation					
and transferrin saturation	3-5 yrs, 12-49 F	1 ml			✓
Serum folate/Vitamin B_{12}	1 and older	700 uL-1 mL		✓	✓
RBC folate	1 and older	100 uL		✓	✓
Serum iron & UIBC	1 and older	1.00 mL			✓
Serum ferritin/TfR	1-5 &12-49F ffm	300-500uL		✓	✓
Serum vitamin A	6 and older	500 uL		✓	✓
Serum vitamin E	6 and older	500 uL			
Serum carotenoids	6 and older	500 uL			
Retinyl esters	6 and older	500 uL			
Vitamin C	6 and older	100ul			
Plasma homocysteine/ MMA	3 and older	1 mL			
Selenium	40 and older	500 uL			
Serum vitamin B_6	1 and older	700uL-1 mL			

Sexually Transmitted Disease Profile

Laboratory Measures:

Chlamydia trachomatis, Neisseria gonorrhoeae, Herpes simplex 1 and 2, HIV, Human papillomavirus virus (HPV) (antigen from vaginal swabs, females age 14-59 years and HPV 16 antibody, all, age 14-59 years) and Syphilis.

Public Health Objectives:

Chlamydia trachomatis and *Neisseria gonorrhoeae* (Urine Test)

Sexually transmitted infections caused by *Chlamydia trachomatis* and *Neisseria gonorrhoeae* may lead to pelvic inflammatory disease, ectopic pregnancy, infertility, and chronic pelvic pain in women. They may also increase the risk of HIV transmission in women. Pregnant women may transmit infection to their newborn causing serious medical complications. At the present the prevalence of chlamydial and gonococcal infection in the general population of the United States is unknown. NHANES offers an opportunity to assess the prevalence of chlamydial and gonococcal infection in the general population and to monitor trends in prevalence as prevention programs are established and expanded.

Herpes simplex 1 and 2 (Blood Test)

Sera from NHANES subjects ages 14-49 will be tested for antibody to Herpes simplex 1 and 2 (HSV-1/2) to continue to monitor the prevalence of HSV-1/2 infection in the U.S. HSV-1 is a common chronic infection that is associated with lower socioeconomic status. HSV-2 is an index of sexually transmitted infections. In addition, questions about those sexual behaviors that are risk factors for sexually transmitted infections and that are the focus of major national HIV and sexually transmitted diseases risk reduction efforts will be included. The joint availability of sexually transmitted infection and risk factor data in a national sample on a periodic basis is a unique and invaluable resource for evaluation of national HIV/STD risk reduction efforts and for risk-based modeling of the frequency and trends of sexually transmitted infections.

HSV-2 infections are rarely life threatening, but morbidity due to recurrent genital ulcerations is substantial. Just as important, HSV-2 infection is the best current marker of sexual behavior risk factors leading to sexually transmitted infections, generally, because: (a) HSV-2 infections are common and, thus, HSV-2 rates are a sensitive measure of sexually transmitted infection risk factors; (b) HSV-2 infection is almost always a result of sexual transmission and, thus, a specific measure of sexually transmitted infection; (c) HSV-2 infections are not curable and, thus, HSV-2 risk is not influenced by health care seeking factors; and (d) sensitive, specific, and relatively inexpensive tests for HSV-2 antibody are available. HSV-2 is a very important index of the success of large national efforts, motivated by the acquired immunodeficiency epidemic, to reduce risky sexual behaviors.

HIV antibody (Blood or Urine Test)

The estimated prevalence of human immunodeficiency virus (HIV) infection in the United States population is an important measure of the extent of the medical and financial burden the nation faces due to this virus. NHANES III data on HIV infection during 1988-94 will serve as a baseline for monitoring the changes in the epidemic over time in the general population of the United States. In addition to HIV testing in NHANES, whole blood samples will be collected and stored for future CD4 testing once the HIV status of the sample is known. This will allow CDC to determine the distribution of CD4 cells in a random sample of HIV positive individuals. NHANES is now the only national survey collecting blood on a population based sample, therefore it will be a key element in future estimates. If the participant refuses phlebotomy but does not refuse the HIV test urine will be tested for HIV antibody.

Human papillomavirus (HPV) (Vaginal s swab – DNA test; Blood test for antibody HPV

Genital human papillomavirus (HPV) infection is likely the most common sexually transmitted infection in the U.S., and cervical infection with certain types of HPV, especially HPV-16, is the single strongest risk factor for cervical cancer. No surveillance systems exist for HPV infections, the majority of which are subclinical. Serum from participants age 14-59 years will be tested for antibody to HPV-16, the antigenic type most linked with cervical cancer to estimate the percentage of individuals of both genders who have ever been infected with this virus. Testing of HPV DNA from vaginal swabs from women 14-59 will provide an estimate of current infection. Vaginal swabs will be tested for HPV DNA by the FDA approved Hybrid Capture II method (Digene) and by consensus PCR with type specific analysis. The Hybrid Capture assay will detect overall high risk HPV types, but cannot identify specific types. The PCR will allow identification of specific HPV type. Participants will be notified of their Hybrid Capture results and specific messages will be developed to explain the implications of the findings based on their age group.

Syphilis

Although there has been a marked decrease in the number of primary and secondary syphilis cases in the United States, there has been very little decrease in the number of reported cases of late latent and tertiary syphilis over the past 20 years. This suggests that there may be a large pool of infected but asymptomatic persons. Although the primary and secondary stages of syphilis are infectious and associated with fetal wastage and the congenital syphilis syndrome, the tertiary stage is associated with a vasculitis that may cause neurologic and cardiovascular manifestations and other chronic problems. Similarly, primary and secondary syphilis increase the risk of HIV acquisition and transmission while latent disease may be associated with progression of HIV disease to AIDS and more prominent neurologic disease in HIV-infected persons. Despite the importance of syphilis as a risk factor for both chronic disease and the progression of HIV infection, there has not been a population-based measure of syphilis prevalence for the United States since 1980. Because these are often asymptomatic stages of infection and may lead to severe neurologic or cardiovascular complications, it is important to document a decrease in the late

stages of syphilis that have resulted from our extraordinary efforts to reduce primary and secondary syphilis. NHANES offers a unique opportunity to estimate the prevalence of reactive serologic tests as an estimate of the prevalence of syphilis infections in the general population, to identify and confirm risk factors for syphilis, to confirm the risk for HIV infection and HIV-related neurologic disease among Americans with syphilis, and to monitor trends in prevalence as syphilis detection and treatment programs are established and expanded.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Chlamydia trachomatis/ Neisseria gonorrhoeae	14-39	4 ml		✓	✓
Herpes 1 and 2 antibody	14-49	500 uL		✓	✓
HIV antibody	18-49	500 uL		✓	✓
Reagenic Non-specific test (Syphilis)	18-49	500 uL		✓	✓
Treponemal Specific test (Syphilis)	18-49	500 uL		✓	✓

* Persons with positive STD or HIV findings will be referred for counseling and treatment.

Justification for using vulnerable populations:

- Teenagers are included because they are at increasing risk for STD's. A pilot study in NHANES III demonstrated an increased prevalence chlamydial infection starting at age 14 years (whites 4%, blacks 12% Mexican Americans 6%).
- Mentally impaired persons will be excluded from the STD profile due to NCHS' inability to provide adequate support and counseling to this group with the test result.

Bacterial Vaginosis and *Trichomonas*

Laboratory Measure:

Female study participants aged 14–49 are eligible for BV and Trichomonas assessments. This protocol is the same as the protocol piloted during the end of 2000. The component consists of questionnaire items, physician counseling and instruction for vaginal swabs, written instructions for the participant and a laboratory protocol. Results will be given to participants at the time they call for their tests results for sexually transmitted diseases and HIV.

Public Health Importance

Bacterial vaginosis (BV) and trichomoniasis are two of the most common vaginal conditions affecting women of childbearing age. In the United States, BV varies depending on the population studied, from 17% in some prenatal and family planning settings to 37% in STD clinics. The same is true for trichomoniasis, with between 3% and 48% of sexually active women diagnosed in various clinical settings. Recent studies have linked BV to adverse pregnancy and gynecologic outcomes, such as preterm labor and delivery, low birth weight, premature rupture of membranes, post-Cesarean endometritis, and post-abortal and post-hysterectomy infections. Also, trichomoniasis has been associated with preterm labor, preterm delivery, and low birth weight. More recently, both BV and trichomoniasis have been linked to an increased risk of HIV acquisition and transmission. However, no national surveillance system exists to measure the full burden of these two diseases, and no reliable national population estimate of BV or trichomoniasis exists. NHANES offers a unique opportunity to assess the prevalence of BV and *Trichomonas vaginalis* infections in the general population, to identify and confirm risk factors, and to monitor trends in prevalence as detection and treatment programs are established and expanded.

MEC interview

The questionnaire items will be added to the existing private MEC Interview. There are no exclusion criteria for these questions.

Physician's exam

The MEC physician will explain the Bacterial Vaginosis and Trichomonas component to eligible participants. He/she will discuss the purpose of the testing and provide instructions for specimen collection. This pre-test counseling will take place during the existing STD pre-test counseling session, which will henceforth be referred to as "Reproductive Health and STD pre-test counseling." After the physician goes through the directions with the participant, she will be given two vaginal swabs, a written set of directions, and will be escorted to the bathroom. If the study participant is uncomfortable with this procedure, the MEC physician will try to answer concerns and questions. As with all of NHANES components, the participant may refuse. Once the participant is in the bathroom, the MEC Physician will ask the MEC Assistant Coordinator to wait for the participant outside the bathroom door where he/she can take the swabs, escort the participant to the next component, and deliver the specimens to the lab.

Time allotment: 3-5 minutes

Exclusion Criteria: None

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
BV	**Females 14-49**	**Self-administered vaginal swab**		✓	
Trichomonas	**Females 14-49**	**Self-administered vaginal swab**		✓	

Report of Findings:

Participants will get their BV and *Trichomonas* swab results via the same reporting system as for STD/HIV testing. This system is a respondent-initiated toll-free phone call to NCHS. Results are given to persons tested after a password is provided to verify identity. Results for BV and *Trichomonas* will be given in addition to chlamydia, gonorrhea, herpes simplex type 2 and HIV (18 and over) test results when the respondent calls.

Blood Lipids

Laboratory Measures:

Total Cholesterol, HDL- Cholesterol, LDL-Cholesterol, Triglycerides, Lp(a), and Apo (B).

Public Health Objectives:

The goals of this component are to:

1. Monitor the prevalence and trends in major cardiovascular conditions and risk factors in the U.S.;
2. Evaluate prevention and treatment programs targeting cardiovascular disease in the U.S.

The main element of the cardiovascular disease laboratory component in NHANES is blood lipid levels. Cardiovascular disease is the leading cause of death in the United States. An estimated 4.8 million Americans have congestive heart failure. Increasing prevalence, hospitalizations, and deaths have made congestive heart failure a major chronic condition in the United States.

The data will be used to:

1. Monitor the status of hypertension prevalence, awareness, treatment and control and the success of the National HBP Education Program;
2. monitor the status of hyperlipidemia and the success of the National Cholesterol Education Program;
3. Estimate the prevalence of congestive heart failure and compare to the baseline data from the NHANES I.

Health Measures, Eligibility, Report of Findings:

Health Measure	Eligibility	Volume Required	Report of Findings Level		
			1	2	3
Total cholesterol	3 and older	+++		✓	✓
HDL-cholesterol	3 and older	+++			✓
LDL –cholesterol	3 and older	calculated			✓
Triglycerides *	3 and older	+++		✓	✓
Lp(a)	3 and older	+++		✓	✓
Apo(BO)	3 and older	+++		✓	✓

+++ For all 5 assays and 2 ml used for persons 6 years and older

Environmental Health Profile

Laboratory Measures:

Environmental Chemical Exposures (See attached list)

Public health objective:

Laboratory Measures:

Blood lead; blood cadmium; blood mercury; serum persistent pesticides; serum noncoplanar polychlorinated biphenyls (PCBs); serum dioxins, furans, and coplanar PCBs; serum and urine levels of phytoestrogens; urine levels of non-persistent pesticides and metabolites; urine heavy metals; urine phthalates; urine polyaromatic hyrdrocarbons.

Public health objective:

Lead

Lead is a known environmental toxin that has been shown to deleteriously affect the nervous, hematopoietic, endocrine, renal and reproductive systems. In young children, lead exposure is a particular hazard because children more readily absorb lead than do adults, and children's developing nervous systems also make them more susceptible to the effects of lead. The primary sources of exposure for children are lead-laden paint chips and dust as a result of deteriorating lead-based paint. The risk for lead exposure is disproportionately higher for children who are poor, non-Hispanic black, living in large metropolitan areas, or living in older housing. Among adults, the most common high exposure sources are occupational.

Blood lead levels measured in previous NHANES programs have been the cornerstone of lead exposure surveillance in the U.S. The data have been used to document the burden of and dramatic decline of elevated blood lead levels; to promote the reduction of lead use; and to help to redefine national lead poisoning prevention guidelines, standards and abatement activities.

Mercury

Uncertainties exist regarding levels of exposure to methyl mercury from fish consumption and potential health effects resulting from this exposure. Past estimates of exposure to methyl mercury has been obtained from results of food consumption surveys and measures of methyl mercury in fish. Measures of a biomarker of exposure are needed for improved exposure assessments. Both blood and hair mercury levels will be assessed in two subpopulations particularly vulnerable to the health effects from mercury exposure: children 1-5 years old and women of child bearing age. Women of childbearing age will also have a urine mercury test. Blood measures of total and inorganic mercury will be important for evaluation of exposure from exposure to mercury in interior latex paints.

Persistent organochlorines (persistent pesticides, PCBs, dioxins)

Organochlorines are diverse, synthetic chemicals that are persistent in the environment and tend to bioaccumulate. Most of these chemicals are banned in the U.S.. Assessment of exposure to persistent organochlorines in representative samples of the U.S. population is needed to determine current prevalence and level of exposure and the potential for human health threat from exposure to these chemicals.

Non-persistent pesticides

Pesticide residues and their metabolites in human tissues and fluids can be indicative of pesticide exposure and the total body burden of these pesticides. Little information is available concerning residential or household exposures to pesticides among the general population. Sufficient data do exist, however, from surveys or other focused research efforts to suggest that household exposure to certain common pesticides can be extensive and might be of significant public health concern. Pesticides of particular concern are: chlorpyrifos, 2,4-D, diazinon, permethrin, ortho-phenyl phenol, methyl parathion, and organophosphate pesticides.

Heavy metals

Trace metals have been associated with adverse health effects in occupational studies or laboratory studies, but have not been monitored in general population groups. Information on levels of exposure to these compounds is essential to determine the need for regulatory mechanisms to reduce the levels of hazardous pollutants to which the general population is exposed and to establish population-based reference intervals for several potentially toxic metals.

Phthalates

Phthalate acid esters (phthalates) are used extensively as plasticizers in a wide range of applications such as children's toys, food packaging, and medical supplies. Because some of these compounds are known to be estrogenic and have been associated with a host of health problems in rats, such as cancers and teratogenicity, governments in Europe and Japan have become increasingly concerned about levels in food packaging materials and children's toys. Biomeasures of phthalates in humans is necessary to evaluate potential human health threats from exposure to these chemicals.

Polyaromatic Hydrocarbons (PAHs)

PAHs constitute a group of chemicals which are formed during the incomplete combustion of coal, oil and gas, garbage, and other organic substances. These compounds require metabolic activation prior to their interactions with cellular macromolecules. PAHs are ubiquitous, thus exposure to them is widespread. In general, people are exposed to mixtures of PAHs, the sources of which include vehicle exhausts, asphalt roads, coal, coal tar, wild fires, agricultural burning, charbroiled foods, and hazardous waste sites. Although most of the data regarding the carcinogenicity of these compounds comes from rats and mice, epidemiologic studies have shown increased mortality due to lung and bladder cancer in humans exposed to coke-oven emissions, roofing-tar emissions, and cigarette smoke. PAHs enter the body quickly and easily by all routes of

exposure and are readily and predominantly metabolized to hydroxylated metabolites as well as glucuronide metabolites. These metabolites are excellent indicators of exposure to the parent PAHs. While background level ranges of PAHs in air and water are known, the equivalent metabolite background levels in humans are not known. Because of increased epidemiologic data relating PAH exposure to cancer incidence, biomonitoring PAH metabolites in humans is very important.

Phytoestrogens

Many different plants produce compounds, called phytoestrogens that mimic or interact with estrogen. The major classes of phytoestrogens are lignans (present in flaxseed, carrots, berries, and grapes) and isoflavones (present in soybeans and other legumes). Biomeasures of phytoestrogens are necessary to establish reference ranges for these compounds and to evaluate their potential effects on human health.

Health Measures, Eligibility, Report of Findings:

Health Measure		Eligibility	Volume Required	Report of Findings Level		
				1	2	3
Blood	Lead/Cadmium	1 and older	0.2 ml (1-5 years): 0.5 ml (6+ years)		✓	
Blood Urine	Mercury	1-5 women 16-49	0.5 ml		✓	
Serum	*Persistent pesticides** Aldrin Beta-hexachloro-cyclohexane Dieldrin Endrin Gamma-Hexachloro-cyclohexane Hexachlorobenzene Heptachlor Epoxide Mirex o,p'-DDT Oxychlordane p,p'-DDE p,p'-DDT trans-Nonachlor 3,3',4,4',5,5'-hexachlorobiphenyl (hxcb) 3,3',4,4'-Tetrachlorobiphenyl (tcb) 3,3',4,4',5-Pentachlorobiphenyl (pncb) 3,4,4',5-Tetrachlorobiphenyl (tcb)	12+ (1/3 sample)	4 ml			

Serum	*Noncoplanar PCBs** PCB 28 PCB 44 PCB 49 PCB 52 PCB 56 PCB 66 PCB 74 PCB 87 PCB 99 PCB 101 PCB 105 PCB 110 PCB 118 PCB 128 PCB 138 PCB 146 PCB 149 PCB 151 PCB 153 PCB 156 PCB 157 PCB 158 PCB 167 PCB 170 PCB 172 PCB 177 PCB 178 PCB 180 PCB 183 PCB 187 PCB 189 PCB 193 PCB 194 PCB 195 PCB 196 PCB 201 PCB 203 PCB 206	12+ (1/3 sample)	test conducted on same aliquot used for persistent pesticides.			

Serum	*Dioxins, Furans, Coplanar PCBs** 1,2,3,7,8-Pentachloro-dibenzo-p-dioxin (pncdd) 1,2,3,4,7,8-Hexachloro-dibenzo-p-dioxin (hxcdd) 1,2,3,6,7,8-Hexachloro-dibenzo-p-dioxin (hxcdd) 1,2,3,7,8,9-Hexachloro-dibenzo-p-dioxin (hxcdd) 1,2,3,4,6,7,8-Heptachloro-dibenzo-p-dioxin (hpcdd) 1,2,3,4,6,7,8,9-Octachloro-dibenzo-p-dioxin (ocdd) 2,3,7,8,-Tetrachloro-dibenzofuran (tcdf) 1,2,3,7,8-Pentachloro-dibenzofuran (pncdf) 2,3,4,7,8-Pentachloro-dibenzofuran (pncdf) 1,2,3,4,7,8-Hexachloro-dibenzofuran (hcxdf) 1,2,3,6,7,8-Hexachloro-dibenzofuran (hxcdf) 1,2,3,7,8,9-Hexachloro-dibenzofuran (hxcdf) 2,3,4,6,7,8 Hexa chlorodibenzofura n	12+ (1/3 sample)	4 ml			

Urine	*Phytoestrogens** Daidzein Enterodiol Enterolactone Equol Genistein o-Desmethylangolensin (O-DMA)	urine: 6+ (1/3 sample)	urine: 3 ml			

Urine	*non-persistent pesticides** 2,4,5-T 2,4,5-Tricholorphenol 2,4,6-Trichlorophenol 2,4-D 2,4-Dichlorophenol 2,5-Dichlorophenol 2-Naphthol 3-Phenoxy benzoic acid Acetochlor mercapturate Alachlor mercapturate Atrazine mercapturate Carbofuranphenol DEET Dicamba Malathion di-acid Metolachlor mercapturate Oxypyrimidine Paranitrophenol Pentachlorophenol o-Phenyl phenol 4-Fluoro-3-Phenoxybenzoic Acid Carbaryl cis-3-(2,2-Dibromovinyl)-2,2-Dimethylcyclopropane Carboxylic Acid cis-3-(2,2-Dichlorovinyl)-2,2-Dimethylcyclopropane Carboxylic Acid 3-Chloro-7-Hydroxy-4-Methyl-2H-Chromen-2-One/Ol N,N-Diethyl-Meta-	6-11 (1/2 sample) 12+ (1/4 sample)	10 ml			

Urine	*organophosphate pesticide screen** Dimethylphosphate Diethylphosphate Dimethylthiophosphate Diethylthiophosphate Dimethyldithiophosphate Diethyldithiophosphate	6-11 (1/2 sample) 12+ (1/4 sample)	10 ml			
Urine	*Heavy Metals** Antimony Barium Beryllium Cadmium Cesium Cobalt Iodine [ICPMS analysis] Lead Mercury (total) Molybdenum Platinum Thallium Tungsten Uranium	6+ (1/3 sample)	10 ml			

Urine	*Pthalates** Mono-n-butyl phthalate Mono-(2-ethyl)-hexyl phthalate Mono-cyclohexyl phthalate Mono-ethyl phthalate Mono-isononyl phthalate Mono-n-octyl phthalate Mono-benzyl phthalate Mono-n-methyl phthalate Mono-(3-carboxypropyl) phthalate Mono-(2-ethyl-5 hydroxyhexyl) phthalate Mono-(2-ethyl-5 oxyhexyl) phthalate Mono-isobutyl phthalate	6+ (1/3 sample)	3 ml			

Urine	*Polyaromatic hydrocarbons** 1-Naphthol 2- Naphthol 3-Fluorene 2-Fluorene 3-Phenanthrene 1-Phenanthrene 2-Phenanthrene 1-Benzo(c)phenanthrene 1-Pyrene 2-Benzo(c) phenanthrene 1-Benzo(a)anthracene 6-Chrysene 3-Benzo(c)phenanthrene 3-Chrysene 3-Benzo(a)anthracene 9-Fluorene 9-Phenanthrene 4- Phenanthrene 1-Chrysene 2-Chrysene 4-Chrysene 3-Benzo(a)pyrene	6+ (1/3 sample)	3 ml			